

The Chemical Nature of Matter

7-5 The student will demonstrate an understanding of the classifications and properties of matter and the changes that matter undergoes. (Physical Science)

7-5.7 Identify the reactants and products in chemical equations.

Taxonomy level: 1.1-B Remember Conceptual Knowledge

Previous/Future knowledge: In 5th grade (5-4.7), students illustrated the fact that when some substances are mixed together, they chemically combine to form a new substance that cannot easily be separated. Students have not been introduced to the concept of reactants or products or chemical equations in previous grades. Students will further develop the concept of chemical reactions and equations in high school Physical Science (PS-4.6 and PS-4.7).

It is essential for students to know that when a substance is broken apart or when substances are combined and at least one new substance is formed, a *chemical reaction* has occurred.

Chemical equation

- Used to represent a chemical reaction that has occurred.
- It contains the chemical names or the chemical formulas of the substances that are involved in the reaction.
- An arrow is used to distinguish between the substances that are broken apart or combined from the substances that are formed in the reaction.
- The arrow can be translated as “yields” or “makes.”

Reactant

- Substances broken apart or combined in a chemical reaction.
- Reactants are located on the left side of the arrow.

Product

- New substances formed in a chemical reaction.
- Products are located on the right side of the arrow.

For example, the following chemical equation shows the formation of water (H₂O) from oxygen gas (O₂) and hydrogen gas (H₂). The reactants are oxygen gas (O₂) and hydrogen gas (2H₂), located on the left side of the arrow. The product, water (2H₂O), is on the right side of the arrow.

Reactant		Product
Hydrogen gas + Oxygen gas	Yields/Makes	Water
2H ₂ + O ₂	→	2H ₂ O

NOTE TO TEACHER: Coefficients in chemical reactions are addressed in indicator 7-5.8.

It is not essential for students to name the various types of chemical reactions that occur (single displacement, double displacement, decomposition, or synthesis) or determine the products in a chemical reaction given the reactants.

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Assessment Guidelines:

The objective of this indicator is to *identify* reactants and products in chemical equations; therefore, the primary focus of assessment should be to retrieve from memory information about the location of reactants and products in a chemical equation. However, appropriate assessments should also require students to *recall* the characteristics of reactants and products in a chemical reaction; *or recognize* the component parts of a chemical equation.